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Point- and curve-based geometric conflation

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Point- and curve-based geometric conflation

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Geometric conflation is the process undertaken to modify the coordinates of features in dataset A in order to match corresponding ones in dataset B. The overwhelming majority of the literature considers the use of points as features to define the transformation. In this article we present a procedure to consider one-dimensional curves also, which are commonly available as Global Navigation Satellite System (GNSS) tracks, routes, coastlines, and so on, in order to define the estimate of the displacements to be applied to each object in A. The procedure involves three steps, including the partial matching of corresponding curves, the computation of some analytical expression, and the addition of a correction term in order to satisfy basic cartographic rules. A numerical example is presented.

Keywords: geometric conflation; interpolation; approximation; inverse distance weighting (IDW)

1. Introduction

The emergence of spatial data infrastructures (SDIs) at the local, national, regional, and global level is an answer to the pressing need to decrease production and operating costs, eliminate duplication in data collection and maintenance, provide timely and suitable data to society, and so on. Successful SDIs are not a goal by themselves, but a means to achieve effective data sharing. The keyword is interoperability, which has implication for services, formats, software, and so on as well as for data themselves. Here we will focus on the latter. Data from different providers might not be interoperable for different reasons. The semantic one can be illustrated by a cross-border problem, with a land-use map classified into 16 classes on one side, while it is sorted into 30 classes on the other side. When corresponding features on different sides of the border do not align we have a geometric problem, referred to by Yuan and Tao (1999) as horizontal conflation. The most common case is when the datasets are for the same area; the authors call this vertical conflation. Typical homolog objects are points (crossroads, monuments, etc.), roads, coastlines, administrative boundaries, and so on, as well as polygons (waterbodies, parcels, etc.).

According to Lynch and Saalfeld (1985) the term conflation has been used for the first time in digital cartography around 1979. It is used to mean the procedure by which the coordinates of features in a given dataset A are modified in order to match exactly or approximately the coordinates of corresponding features in another dataset B. The same

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